

A Dravidian decipherment of Indus script

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5 Abstract

The Indus script writing system is described here as a logo-syllabic system with almost unique syllables associated with them. The crucial aspect of the decipherment is the observation that semantic value of numbers are not related to quantifiers but are used as adjectives such first/strong/mature etc., through the syllables that are derived out of it. The standalone semantic
10 values of the logo have crucial role to play in deciding the syllabic value of the logo, but it only uses the modified syllabic value in the instances of the text. Although main syllabic value is maintained around it's primary consonant value, the syllables have pluripotency both in terms of semantics and syllables in context, i.e., they have modified vowels and soft consonants (glides).

This decipherment is not only about syllabary, it also provides complete semantic decipherment as
15 well, uncovering various aspects of the life of Indus Valley Civilization. Most of the seals are about the barter trade transactions and describe from/to addresses, with mode-of-transport indicated in-between. The urn-symbol is deciphered as "ūr" (town/village) with various adjectives preceding it (or infused into the sign) describing the town. The unicorn-seal indicates that it is trade-related activity. The fish-signs and arrow signs describe the mode of transport of goods. The goods are
20 indicated by the object before the animal indicating whether it is a food-type or not (perishable goods or not). The decipherment also uncovers aspects other than trade, like marriage and disputes.

Prelims

We list a few acronyms/initialisms that is commonly used in the article:

- IVC : Indus Valley Civilization
- 25 DED: Dravidian Etymology Dictionary [1]
- M77: MASI 77, Mahadevan [2]
- WB: Wells, B., Indus Writing [3]
- MVB: M.V.Bhaskar [4]

DED refers to the entry numbers in Dravidian Etymology Dictionary [1]. Here we use M77 to
30 denote Mahadevan's sign numbers [2], but the glyphs in this paper were created using Asko Parbola's NFM Indus Script font. Mahadevan has simplified and reduced the number of signs, by considering many of them as variants of the same theme or treating them as identical. For a richer source of symbols and data, please refer to Wells [3] or the character list in NFM Indus Script font.

Introduction

35 Indus valley civilization was contemporary to other civilizations such as the Mesopotamia and Egyptian civilizations with it's own independent system of writing. Each of these systems had their

own culture and languages that were unique to their own civilization. It is a great challenge to decipher any one of them without a multilingual Rosetta stone, but such decipherments have been successfully achieved in the case of Linear Elamite [5]. In the case of Indus script it has been well
40 established, through various indirect attempts, that it is closely related in cultural aspects with the ancient Dravidian culture and language. However, broad confusion arises when attempts are made to relate it to an alphabetic system as it seems similar to a complex logo-syllabic system like the Egyptian system of writing. There have been many futile attempts to conjure-up such a relation
45 between the Tamil Brahmi writing system and the Indus script, despite of the fact that the Indus signs have strong pictorial content.

It took a while for the modern alphabets to arrive (around 1000 BCE) and one can expect that the logo-syllabic system of Indus script, like the earlier versions of Egyptian writing system, to be pre-alphabetic/abugida stage, where pure consonants have not yet been crystalized and extracted out of the spoken languages. From this decipherment it seems that the atomic units (signs) of the IVC
50 writing system are logo-syllables, with the high potential for creating homophones, thus reducing the number of signs required for the orchestration of the writing system within the specific context of IVC society and it's trade transactions.

In this decipherment, the author followed the trail left by these signs (like a detective), as it uncovers through internal evidences tracing them one by one. Sometimes serendipity plays a big
55 role in our findings, and all this would not have been possible but for the enormous sign lists and concordance data that has been gathered painstakingly by many reserachers over very many decades, making them freely accessible online. Of course, it also helps if your mother tongue has roots to the very same language and culture, although displaced in time by more than 5000 years!

In the next section we first outline the syllabary of Indus script as it is preceived here. Detailed list
60 of all symbols and their syllabic values are described in a later section on "Syllabic development". After the next section on orthography we briefly describe the skilled artistry of Indus writing system, then the crucial role of Numbers, Clitics and the system of "Learning through pun". In the section after "Syllabic development" we describe a few frequent phrases that emerge out of the corpus with two or three logos. We then classify a few logos under functional ideographic
65 categories (although they are primarily syllables they also have certain ideographic tendencies). Next we outline the crucial aspects of fish signs and their various manifestations. In the section after this we briefly sketch the dominant trade activities and their relative importance and it's implications in the development of a class society. We then go on to decipher several lines of text in the corpus and also seals containing interesting graphical content with their corresponding text in a
70 "Show and tell" section. We end the body of the article with sections about "Overlap with previous work" and "Acknowledgements".

Orthography of the Indus script

The logo-syllabic syllabary of Indus will be described here as it is preceived here in use. We try to discern if there are broad rules of orthography in this writing system that we can observe. We will
75 start with some simple number systems and see how they can prefix or suffix to other symbols/syllables in the system.

To begin with we use a simple rule that there is one and only one syllable to which each of these signs get assigned to. This is a simple rule to follow and it can be easily be discerned if it breaks. We will now describe the other patterns or rules that we observe.

- 80 Let us now consider the M77 sign-373 ○ to which we assign the syllable “pa” (from “pakaḷ”, meaning the sun or daylight). For the sign-86 | we assume that it has the value “mutaḷ” (the primary one) and then see how it applies to the sign-375 ⊙. We believe that this value is indicated by the sign-376 ∪ that has a tooth attached to it. So we have:

pa + mut-aḷ = paḷ

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Now let us consider the sign-391 ⊗, a sign that we know has strong correlations with elephant seals from MVB [4] findings, so we assign the value “paḷḷa” that also has close proximity to “paḷ”, but we can see there are three cross-lines and/or six small pieces, making it more like “pillir”. There is also another possibility that this is decided by DED 1045 ṁṭai/ṁṭa, a metal badge that is applied to the forehead of the elephant. So we observe that although broad rules are applied, there are also *ideosyncracies* of local culture that also provide a few interesting twists and turns, but in general it tries to confirm to some broad outlines.

- 90

We will now move to the interesting sign-287), which we have assigned the value “valai/valai” after looking at it’s close cousins sign-298 ∟ and sign-290 𐌶 that has five strokes affixed to it’s top-right.

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∟ = 𐌶 =) + ∟∟∟ = vala + ai = valai

Doubling on that we get,

∟∟ = valai + ∟∟∟ = valai + ai = valaianjih or valaicci or valayacci

If sign-290 has three strokes on top we can get,

- 100 𐌶 = valai + ∟∟ = valai + mu = valaiyam

Semantically “vala/vala” is “right/curved” as the symbol right parenthesis and when combined with “5” (ai) it becomes valai.

- We also observed for M77 sign-62 (𐌶) that we can assign value “vālai” (scabbard fish that has sharp teeth). The sign-295 𐌶 “iru-valai” sounds similar to “ēri-vāḷai”. These signs also indicate that such deformation of the base syllable is possible, i.e., “valai” ≈ “vālai” and “ēri” ≈ “iru”. Of course, high homophony is one of the crucial principles in creating a script with minimal number of signs.

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Next, we look at sign-81 (𐌶) that we assign the value “valai-puri”, while we assign sign-63 (𐌶) the value “kanni-pori” (DED 1183, 4538, 4603). This then decides “kanni” for fish-sign and “puri” ≈ “pori” for bird (quail) sign.

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Based on these successes we decide to take a look on the other variants of fish-sign. For sign-70 𐌶 we apply “kāḷ” (DED 1483 assigns the semantic value of “cart”) and for sign-72 𐌶 “kōḷ” (DED 2238 assigns a semantic value of “raft/float”). One might ask why not assign the values the other way around, but the important clue comes from the cross-line that looks more like paddle/oar. Yes, again there are some *ideosyncracies* that comes with it.

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We now move to sign-328 \cup for which we assign the value “ū/u/va”. So for the sign-332:

$$\text{𑌵} = \cup + \text{𑌶} = \text{va} + \text{ai} = \text{vai}$$

Similarly we also get the very important sign-342:

$$\text{𑌷} = \cup + \text{𑌸} = \text{ū} + \text{iru} = \text{ūr}$$

120 Next, we get on to double affix, sign-336 \cup :

$$\text{𑌹} = \cup + \text{𑌺} + \text{𑌻} = \text{u} + \text{mu-ta-l} + \text{𑌻} = \text{uṭaṇ} \text{ (DED 945)}$$

Here sign-374 𑌻 takes the value “𑌻” (from droplet, “nīr”) and sign-336 \cup (uṭaṇ) has the ideographic association with mortar & pestle (a marriage ritual association as well)! In the M77 concordance list the sign-321 𑌾 is immediately preceded by sign-336 \cup . As the two sign-374 𑌻 are joined together by a string, a value of “ñāṇ” (DED 2908 “string”) will be the correct one:

$$\text{𑌾𑌹} = \text{uṭaṇ} + \text{ñāṇ} = \text{uṭaṇ-ñāṇ} \text{ (marriage agreement)}$$

Although the picture speaks thousand words there are also hints of syllables through micro-typography in Indus script. Consider sign-402:

$$\text{𑌼} = \text{𑌽} + \text{𑌺} = \text{na} + \text{ṭu} = \text{naṭu}$$

$$130 \text{ 𑌾} = \text{𑌶} + \text{𑌼} = \text{nāl} + \text{naṭu} = \text{nāṭu}$$

$$\text{𑌽} = \text{𑌺} + \text{𑌽} = \text{mutal} + \text{ni} = \text{maṇi}$$

$$\text{𑌽} = \text{𑌽} + \text{𑌺} = \text{ni} + \text{mutal} = \text{aṇiyal}$$

and now let us consider another sign-51:

$$\text{𑌾} = \text{𑌶} + \text{𑌷} + \text{𑌸} = \text{mu} + \text{iru} + \text{an} = \text{māran}$$

135 with an additional twist as “māran” twists and looks back (a feature observed by Mahadevan and passed-on through personal communications by MVB).

Of course, we can also say as additional double-emphasis things like:

iruvaṇi-māran-kuṛumpu

(true-path māran chief)

140 Now on to another topic:

M77 No.	Glyph	Roman	Tamil
169	𑌶	nilam	நிலம்
171	𑌶	nilai	நிலை
174	𑌶	iru-nēla	இருநெல்
88	𑌶	nal-iru	நல்-இரு

These are characters that seems to stand-out (pun intended with “nīl” being DED 3675 “to stand”), i.e., decided more by the context of IVC barter transactions and not by any complex orthography rules.

145 So as a broad outline we can say that the signs in IVC script are strongly associated with unique syllables and that the IVC writing system allows plenty of ways to mutate them in many ways from their base ideographic glyph values. However, it is not clear that in the case when there are multiple affixes applied, then which comes first, i.e., whether a base glyph applies first etc. In general one could assume it flows from right-to-left and top-to-bottom, but I suppose there are many exceptions
150 that are decided by the context.

For example the famous sign-116 '𑀓𑀔' can take the value “nellai/nallai” but the other-way around can also be “ayaḷ” is quite unlikely in the IVC transaction context. Sign-112 '𑀓' works as “munṇāḷ” but in the semantics of IVC transactions “ṇāḷam” works better. Of course, both are possible and even within the context of IVC “munṇāḷ” might be a better choice in some particular
155 case.

The non-affixed pure IVC signs have unique syllables associated with them, which have either single consonant and two consonants at the most. The combining rules usually seem to drop the middle consonants, and of course the vowels are modified as pertinent to the situation.

In some cases the components may not be a disjoint merger but a continuous merger (welding) of
160 the two as in this case:

𑀓𑀔 = 𑀓 + 𑀔

taṛi = tan + vaṛi

Finally as an interesting remark I would like to bring to attention a nice little sign-310 𑀓𑀔 with a probable value of “vilaviḷa” (DED 5424)

165 𑀓𑀔 = 𑀓 + 𑀔 = vil + vil = vilaviḷa

that sounds similar to “vavvāḷ” (long-tailed fruit bat?) as used in this line of text:

𑀓𑀔 𑀓𑀔 𑀓𑀔 𑀓𑀔

Trembling with fear “vilaviḷa” cognates well with “eerie bat”, so we try to decipher this line.

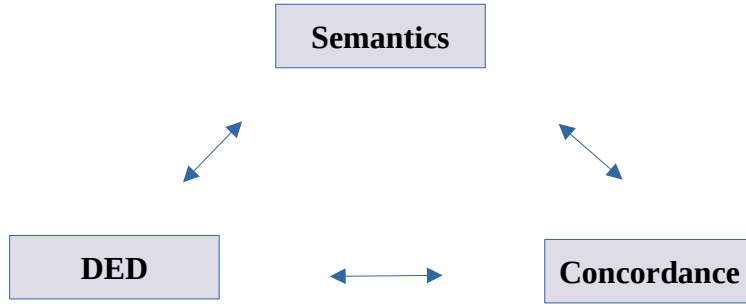
170 Vilamban trembling with fear “loading” (māṭṭu, 𑀓𑀔) the bow, but what’s to the right of vilamban, a tiger? Tiger trembling or the hunter trembling? So we notice that it could be:

ciruttai = cīpu + iru-tai = 𑀓𑀔 + 𑀔 (right-to-left) = 𑀓𑀔

This describes the process of discovery through an example. As a broader generalization we could insist for Dravidian decipherment that the following triangle commute (i.e., more like walking on three legs or squash on three walls):

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180



We illustrate this with a line of text:

⌈ ⌋ ⌈ ⌋ ⌈ ⌋ ⌈ ⌋

185 valan.ai-iru.valai-varvan.ūr-anjih

To fit it into the context we need to modify this to:

valamai-iru.vilai-vuṛavan.ūr-anjih

வளமை இருவிளை உழவனார் வஞ்சி

Semantics:

190 Fertile highly productive farmer's town paddy

or

Fertile double-crop farmer's town paddy

We now show how consonants and vowels express themselves in this system, but since it is not an alphabetic system, they don't carry any special importance by themselves as there are many more

195 syllables with single and double consonants that are used to complete the language.

Consonants and their signs

Consonant	M77 sign	Glyph	Roman	Tamil
ka (க)	59	𑌕	kaṇṇi	கண்ணி
ce (சே)	76	𑌔	cēval	சேவல்
ta (த)	216	𑌖	tanṭi	தண்டி
pa (ப)	373	𑌘	pakal	பகல்
pu (பு)	78	𑌚	pūr	பூர்
pū (பூ)	54	𑌛	pū	பூ
ma (ம)	242	𑌙	māṭi, māṭu	மாடி, மாடு
mē (மே)	197	𑌛	mēl	மேல்
mu (மு)	86	𑌛	mu	மு, முதல்
mū (மூ)	89	𑌛	mū	மூ, மூணு
na (ன)	374	𑌛	na	ன
nā (நா)	95	𑌛	nāl	நால்
r (ர)	87	𑌛	ranṭu	ரண்டு
va (வ)	328	𑌛	va	வ

Consonant	M77 sign	Glyph	Roman	Tamil
ra (ர)	400	𑌒	ra	ருழ
ru (ரு)	110	𑌒𑌒𑌒𑌒	ru	ழு

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Although vowels and glides can be arbitrarily mutated, modified or introduced in to the system while combining with the base syllable, the vowels are very much required at the beginning of a word. We list a few here.

Vowels and their signs

Vowel	M77 sign	Glyph	Roman	Tamil
an (அ)	1	𑌑	an	-அன்
āṭu (ஆ)	50	𑌑𑌒	āṭu	ஆத்து ஆடு
ila (இ)	323	𑌑𑌒𑌒	ila	இல
ūr (ஊ)	342	𑌑𑌒𑌒𑌒	ūr	ஊர்
eṛu (ஏ)	110	𑌑𑌒𑌒𑌒	eṛu	ஏழு

Skilled artistry of Indus script

At the core of Indus script lies the mastery of a skilled metallurgist (𑌑𑌒). We will illustrate this with these with few examples:

𑌑𑌒𑌒𑌒 = 𑌑𑌒𑌒𑌒 = vēl-aṇi-nuṛan-ūr = வேல்அணிநுழனூர்

The semantic meaning being the town with tailors, jewellery and hunting professions.

𑌑𑌒 = | 𑌑 𑌒 || || = mu-iru-mēl-pēr-ul = மூவிரு மேல்பொருள்

In this case the semantic meaning could be the mighty great guardian of the township (elevated to kings and gods at later times).

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Some important places and townships

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This is just indicative of the various kinds of townships and professions, and a deeper quantitative study is required to obtain their relative importance. What is interesting is that the third one in the list is farmer's town, which doesn't count really as a town, but in Dravidian languages, the term "ūr" seems to cover what we call "village" also. Here we use M77 to denote Mahadevan's sign numbers [2], but the glyphs in this paper were created using Asko Parbola's NFM Indus Script font. DED refers to the entry numbers in Dravidian Etymology Dictionary [1]. For a richer source of symbols and data, please refer to Wells [3]. Some of these signs here have been identified earlier by other authors, so a proper acknowledgment of these facts will be added later on in a separate section.

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M77 Sign	Glyph	Syllable	DED	Description	Tamil
402	𑌕	nāṭu	3638	country	நாடு
342	𑌖	ūr	752	town	ஊர்
15	𑌗	uṛavūr	688	working, farming town	உழவூர்
347	𑌘	vēlūr	-	hunter's town	வேலூர்
358	𑌙	chevūr	-	bronze worker town	செவ்வூர்
351	𑌚𑌛	vēl-nuṛan-ūr	-	hunter-cloth worker town	வேல்நுழவூர்
?	𑌛𑌜	che-palla-ūr	-	bronze-elephant worker town	செவப்பல்லூர்
355	𑌛𑌝	vēl-palla-ūr	-	hunter-elephant worker town	வேல்பல்லூர்
361	𑌛𑌞	che-ko-ūr	-	herder-bronze worker town	செங்கோவூர்
372	𑌛𑌟	vēl-aṇi-nuṛan-ūr	-	hunter-jeweller-tailor town	வேல்அணிநுழனூர்
176	𑌠	añcal, anjīh	54, 56	resting place	அஞ்சல், அஞ்சி
254	𑌡	paṭṭi	3848, 3850	place	பட்டி
245	𑌢	taṭṭi	3036	place	தட்டி
137	𑌣	cēri	2007	assembly	சேரி
190	𑌤	pālaiyam	4117	tribal hamlet	பாளையம்

Numbers

Numbers are treated separately, but they are just like other glyphs, easily welded and affixed to other glyphs, producing a plethora of possibilities. However, they are an important pointer to the fact that the actual standalone semantic value (in this case the numeric number) of the glyphs may have very little to do with it's semantic value.

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M77 Sign	Glyph	Syllable	DED	Description	Tamil
86	𑌥	mutal, -al	4950	one, primary	முதல், -ல்
87	𑌦	-ar, -ir, iru-	474, 481	big, great, eminent, two	ரண்டு, -இர், -ர், இரு-
89	𑌧	mū-, mūn-	5052	mature, three	மூ-, மூன்-
95	𑌨	nal-, -nāl, nalla-	2912	good, four	நல்-, -நால், நல்ல-
96	𑌩	-ai	2826	unite, five	-ஐ
108	𑌪	aru-, -ar	2485	river, fort, six	ஆறு, அறு
110	𑌫	eṛu-, -eṛu	910	rise, fertile, seven	ஏழு, -எழு
Application of above phonemes					
112	𑌬	nalām, nālam, munnāl	2913	land, healthy, before	நலம், நாலம், முன்னால்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
116	𑌛𑌛𑌛𑌛	nallai, nellai	-	rice	நல்லை, நெல்லை
121	𑌛𑌛𑌛	nal.nel.āl	-	good rice person	நல்நெல்லாள்
120	𑌛𑌛𑌛	mū-munamum	-	three generations back	மும்முன்னோனும், மும்முன்னமும்
119	𑌛𑌛𑌛	mū-munnor	-	two generations back	மும்முன்னோர்
107	𑌛𑌛	mūri, mūrā	5041	bullock, buffalo	மூரி, மூரா
93	𑌛𑌛	mutalvar	4950	chief	முதல்வர்
94	𑌛𑌛	iral, irāl	-	-	-இரல், -இராள்
177	𑌛𑌛	nal-mutal, nalāl	-	good chief, good worker, hard worker	நல்முதல்-, நல்லாள்

Clitics

Clitics provide sentence structure (the subject and the object). The default reading order is right to left, but before the clitic 𑌛 (sign 99), the reading is supposed to be left to right (but this doesn't seem to be followed strictly by writers of IVC script).

M77 No.	Glyph	Syllable	Tamil
97	𑌛	-il, -da, -ta, -in	-ட, -டு, -த, -து -இல், -இன்
99	𑌛	-ra, -ru	-ர, -ரு, -ற, -று
123	𑌛	-yar, -yin	-யர், -யார்
344	𑌛	ūr-ār	ஊரார்
343	𑌛	ūr-il	ஊரில்

225

The Indus writing is not without it's own inaccuracies, either by themselves or captured by mistake by the scribes. We noticed a few cases where the clitic sign-99 𑌛 has been captured as sign-87 𑌛, which in those particular instances seem more like a case of sign-99 rather than sign-87. However, it must be mentioned that there are very few mistakes in the Mahadevan's corpus (both in intent and purpose), which has done a nice balancing act between variety and simplicity, thus making it easier for decipherment. For a slightly different opinion from Mahadevan on the list of signs is Wells [3]. We follow Mahadevan's sign list and numbers here, but it must be possible to do it using Wells [3] list of signs and sign-number as well without any loss of generality.

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Learn through pun

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Following are an indication of the pun that abounds in Indus script, which is termed as the "rebus principle". Of course, it only makes sense if your language is close to ancient Dravidian. For deeper understanding you may have to refer to some of the sign values below this in the section on "Syllabic development". We only sketch a few, but the Indus script syllabary abounds in such pun.

240 The reduction of number of glyphs required for a writing system for Dravidian language is very much dependent on prudently choosing glyphs that provide highest possible homophony.

M77 Sign	Glyph	Syllable	DED	Description	Tamil
298	))))	valai = vala+ai	5267, 5288	) = vala+5	வல+ஐ=வலை
	Right-parenthesis is “vala” (curved as well as right) in Tamil and “vala” + “ai” = “valai”. “vala” is curve, as well as “right”, which fits well with description of right parenthesis. Also,)))) can be further expanded as “valaicci” or “valayacci” or “valayanjih”.				
62	(𑌕)	valai-kanni	5379	scabbard fish with fang-like teeth	வாளை கன்னி (மீன்)
	The fish “vālai” is known as the scabbard fish that has sharp teeth. A nice tooth is drawn at the top to elucidate the learning. This explains that the right-parenthesis sign-287 carry the phonetic value “valai”				
295	)𑌕	eri-valai	902	Another sharp tooth fish	ஏரி வாளை (மீன்)
	A fresh water shark, Wallago attu , also known “eri-valai”, a pun again on the word with rebus equation: “vālai” ≈ “valai”. The prefix “eri” comes from “two” or “iru”, leading to one more rebus equation: “iru” ≈ “eri”.				
63	(𑌕𑌕)	kanni-pori-valai	-	Trapping of birds	கன்னி-பொறி-வலை
	This learning tablet defines the phonetic value of fish as “kanni” and the bird as “puri” by defining it through a polysyllabic pun as “kanni-pori” with a parenthetic “valai” . The “kanni-pori” in Tamil is “trapping”.				
64	⋮(𑌕𑌕)	valai-kanni	-	The clitic reverses reading order	கன்னி-பொறி-வலை
	The clitic sign 64 reverses the reading order to the right of it. This learning script defines that.				
376	𑌕𑌕	pal	-	teeth	பல்லு
	A teeth is indicated by the protruding teeth effect, just like in the fish teeth.				
57	𑌕𑌕𑌕	irumpu	486	iron	இரும்பு
	Now we have triple pun: iru-pu (two insects) ≈ erumpu (ant) ≈ irumpu (iron)				
181	𑌕𑌕𑌕	kottu	2065, 2064	pour (sting)	கொட்டு
	We can see pincler claws are indicated to show “sting” and “pour” are homophones in Dravidian “kottu”. The stinging honey-bee also is supposed elucidate connotations of “honey” that pours (kottu) from the beehive.				
310	𑌕𑌕𑌕	vila-vila	5424	tremble with fear	விலவில
	This cognates with “vavvāl” (DED 5370), probably a long-tailed fruit bat, with an eerie shivering scene that it creates.				

M77 Sign	Glyph	Syllable	DED	Description	Tamil
303	) (	iṭa	432	cleft, gap, split, crack open, slit, breach, chasm	இட
Also works as “iṭaveli” ≈ “iṭai-valai”.					

Signs and affixes

Just to give a flavor of the decipherment here we group few signs under base/affix geometry. In some cases there could be more than one affix. For more details see next section “Syllabic development”.

245 Sign ○

Affix Base	|	||	|||	||||	|||||	Ψ	◊	◊	◊ |	⋈	||| - ||
○	①	∞	∞	∞	⊗	⊗	⊗	⊗	⊗	⋈	|||⊗
pa	pal	para	pammu	nal-para	pallā	vel-appa	pān	cirappu	pānal	pān-an	nal-pallar
பா	பல்	பற	பம்மு	நல்பற	பல்லா	வெல்-ப்பா	பாண்	சிறப்பு	பானல்	பானன்	நல்பல்லர்

Sign U

Affix Base	|	||	|||	||||	| ◊	| ◊ ||||	Ψ ||	- ||	⋈ Ψ
U	U	U	U	U	U	U	U	U	U
ū	vaḷ	ūr	ūm	vai	uṭaṇ	uṭai	velūr	chevūr	vel-aṇi-nuṇan-ūr
ஊ	வள்	ஊர்	உம்	வை	உடன்	உடை	வேலூர்	செவ்வூர்	வேலணிநுழைநூர்

Sign ✕

Affix Base	|	| ◊	||||	||	◊	||| ||	◊	-	⋈
✕	✕	✕	✕	✕	✕	✕	✕	✕	⋈
ta	taḷ	tan	tai	irutai	ciruttai	mumutai	tāri	toṭu	tan
த	தள்	தன்	தை	இருதை	சிறுத்தை	மும்முதை	தாழி	தொடு	தன்

Sign ✧

Affix Base	|	|	^	^	||	|||
✧	✧	✧	✧	✧	✧	✧
kanni	kāl	kōl	peru-kanni	peru-kaṇai	kōnda, gōnde	kanāl
கன்னி	கால்	கோல்	பெருங்கன்னி	பெருங்கணை	கொண்ட, கோண்டே	காணல்

Sign 人

Affix Base	|	||	| - |	人	-	^	|	||| - |
人	人	人人	|人|	人	人	人	人|	|人|
an	āl	aṇṇan	kāvalan	naṭṭan	uṛavan	kīṛrān	mutalvan	nal-mutalvan
அன்	ஆள்	அண்ணன்	காவலன்	நாட்டான்	உழவன்	கீழன்	முதல்வன்	நல்முதல்வன்

Sign ◇

Affix Base	◇	||||	|||	✕	甲	⊕)
◇	◇	◇	◇	✕	◇	◇	◇
kō	kōṭṭa, kōṭu	kōṭai	kōṭṭam	nāl-vaṛi-kōṭai	nērcira-kō	pallar-kōṭṭa	kōṭai-vaṛi
கோ	கோட்ட, கொட்டு	கோட்டை	கோட்டம்	நல்வழி-கோட்டை	நேர்சிற-கோ	பல்லர் கோட்டை	கோட்டை வழி

Sign)

Affix Base	180°	○	○ 180°	- 180°	90°	270°	||
)	(	)	(	)(	⤵	U))
valai	iṭai	valaiyan	iṭaiyan	iṭa	kuṭa, kuṭai	ū	iru-valai
வலை	இடை	வலையன்	இடையன்	இட	குடை	ஊ	இருவிளை

Sign ○

Affix Base							○ ○		≡
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Base									
○	୧	୨	୩	୪	୫	୬	୭	୮	୯
-n	nāṭu	aṇiyal, maṇi	ñāṇ	nan	nannu, nannan	nalnelāl	nuṛan	nan-mutal	nāṅkuṛu
ன்	நாடு	அணியல், மணி	நாண்	-னன்	நன்னு, நன்னன்	நல்நெல் லாள்	நுழன்	நன்முதல்	நன்குழு

Aglutinative logo-graphic structures in Indus script and proof of decipherment

260 One the simplest assumptions one can enforce in a script is to associate a unique syllable to each sign. The next easy assumption to make is to consider complex signs through an agglutination of simple base signs. In a society that makes brick & mortar constructions and tinkering of bronze structures, such a process is natural.

265 There are atleast 417 signs in the Indus script as described in M77 [1]. In this work we shall construct a morphological approach to these ideograms to show how a substantial portion of the signs can be constructed through agglutination of the base signs.

Proof of decipherment is the application of Occam's razor, according to which the most appropriate theory is the one that fits the data with the least underlying principles and core signs. More than this principle, the proof of decipherment is in the pudding, i.e., it should lead to a meaningful semantic reading of the lines without any failure (almost say 95% success, a R.A.Fisher significance value).
270 We shall provide such a proof of decipherment after introducing the signs and their syllabic values.

Base signs

M77 Base	M77 Sign	Glyph	Syllable	DED	Description	Tamil
1a	86	|	mutal, -al	4950	one, primary	முதல், -ல்
1b	237	□	mutal	4951	base, foot, stump	முதல்
1c	?	/	vāl	5376	sword, sharp	வாள்
1d	?	\	cuṭṭi	2656	crest, tuff, smart	சுட்டி
1e	86-87	l, ʸ	nil	3675	stand	நில்
2a	87	||	-ar, -ir, iru-	474, 481	big, great, eminent, two	ரண்டு, -இர், -ர், இரு-
2b	124	Λ	ēr	2815	plough	ஏர்
2c	125	Λ	eru	863	full, strong	ஏறு
2d	126	Λ	cēr	2814	join, unite, mingle	சேர்
2e	161	ʸ	vilaku	5423	diverge	விலகு
2f	365	∨	viri	5411	spread, expand, blossom	விரி

M77 Base	M77 Sign	Glyph	Syllable	DED	Description	Tamil
2g	137	𑌒	cēri	2007	village street, assemblage, hamlet	சேரி
3a	89	𑌔	mū-, mūn-	5052	mature, three	மூ-, மூன்-
3b	233	𑌕	mūmalai	5052	three mountain range	மும்மலை
3c	230	𑌖	mumalai	5052	three mountain range	மும்மலை
4	95	𑌗	nal-, -nāl, nalla-	2912	good, four	நல்-, -நால், நல்ல-
5	96	𑌘	-ai	2826	unite, five	-ஐ
6	108	𑌙	aru-, -ar	2485	river, fort, six	ஆறு, அறு
7	110	𑌚	eru-, -eru	910	rise, fertile, seven	ஏழு, -எழு
8a	1	𑌛	an	131, 132	person	அன்
8b	12	𑌜	uṛavan	688	farmer	உழவன்
9	162	𑌝	vēl, vėl	5545, 5536	chief, spear, trident	வேல்
10	374	𑌞	-n	1159b, 3621, 3621a	night, bug	நீர் (துளி), (ப)னி, நள், நல்லு
11a	299	𑌟	ida, idai	449	hip, left	இட-, இடை
11b	287	𑌠	vala-, vaḷai	5313, 5314, 5288	bent, trap, right, net	வல, வள, வலை, வளை
11c	304	𑌡	vil, viḷ	5422, 5421, 5432, 5433	bow, call out, sell	வில்
11d	311	𑌢	yār, eṛil	5156	harp, music, beauty	யாழ், இசை, எழில்,
11e	296	𑌣	vaṛi	5297	way	வழி
11f	149	𑌤	nālvaṛi	5297	cross-road	நால்வழி
12	312	𑌥	kuṭi, kuṭai	1655, 1660	house, family, lineage, hollow, cavity, penetrate	குடி, குடை
13	328	𑌦	u, ū, va	651, 761	ooze, mortar	ஊ, உ, வ
14	373	𑌧	pa	3805, 4016, 4124, 3884	sun, pot	பகல், பள்ளம், பானை, பண்
15	186	𑌨	kūru, kuru	1924,	section/division/	கூறு

M77 Base	M77 Sign	Glyph	Syllable	DED	Description	Tamil
				1921, 1782	share, to proclaim, brilliant	
16	254	𑌕	paṭi, paṭṭi	3848, 3850, 3868	hamlet, village, settlement, rest, roost, step gradee, rank	படி, பட்டி
17	216	𑌖	ta (tandi, tondi, tavalai)	2946, 3110, 3549	earthen pot	தண்டி, தோண்டி, தவளை
18	59	𑌗	kaṇ, kanni	1159a, 1166, 1168, 1417, 1483	eye, bamboo raft, trap, trapper	கண், கன்னி
19	78	𑌘	pori, puri, purā, purā, pūr	4286, 4334, 4374, 4603	courage, pride, chicken, pigeon, dove, quail, pheasant	புரி, பொரி, புறா,
20	319	𑌙	muri, muṛi	4977, 5010, 5008	twist, twine, tender leaf, shoot, sprout, break, perish	முரி, முறி
21	132	𑌚	ala, alai	240	wave, commotion	அல, அலை
22a	134	𑌛	peru, pēr	4411	big, large	பெரு, பேர்-
22b	204	𑌜	meruku, mēruve	5074, 5094	shining, pyramid	மெருகு, மேரு
22c	205	𑌝	nal-kompu, nāmpu	2115, 3649	good clever, sprout of millet	நால்கொம்பு, நாம்பு
22d	261	𑌞	kō	2177, 2178	mountain, gentry	கோ, கோட்டை
22e	201	𑌟	vāyil, vāyal, vācal	5354	doorway, entrance	வாயில், வாசல்
22f	244	𑌠	aru, ārru, arai, araṇ	317, 407, 322, 201	strong, dwellment, camp, room, castle	அறு, ஆறு, அறை, அரண்
22g	242	𑌡	māṭi, māḷikai, māṭam	4796a	mansion, terrace, hall	மாடி, மாளிகை, மாடம்
22h	197	𑌢	mē, mēṭu, mettai	5086, 5058, 5069	top, terrace	மேல், மெத்தை
22i	202	𑌣	mēṭṭu, mēḍu, metta	5058, 5069	height, eminence, hillock, upper storey, storied house	மேட்டு, மேடு, மெத்த
23	245	𑌤	taṭṭi, taṭṭu, taṭṭāṇ	3036, 3039	cloth, wooden frame, hammer, tap	தட்டி, தட்டு, தட்டான்

M77 Base	M77 Sign	Glyph	Syllable	DED	Description	Tamil
24	155	𑌕	ampi	177	boat, raft, ship	அம்பி
25	211	𑌖	anuppu (ampu), anpu	329 (178), 330	send, love	அனுப்பு, அன்பு
26	83	𑌗	irakkam, irappu, irakkam, irappu	501, 514	death	இழக்கம், இழப்பு, இறக்கம், இறப்பு
27a	50	𑌘	āṭu	347, 5152	dynamic, enjoy, play, dance, goat	ஆடு
27b	184	𑌙	ampalam	173	village assembly	அம்பலம்
28	47	𑌚	araṇ, araṇa, araṇai	201, 203, 204	fortress, gift, squink	அரண், அரண, அரணை
29a	49	𑌛	kurumpu, kuḷampu	1844, 1829	chieftain (kurumba tribe)	குறும்பு, குளம்பு
29b	51	𑌜	māru, mārru, mārrī, māran, iruvaṇi-māran-kurumpu	4834	barter, strong leader	மாறன், இருவழி-மாறன்-குறும்பன்
29c	302	𑌝	mārral, māru-koḷ	4834	exchange	மாற்றல், மாறுகொள்
29d	129	𑌞	koḷ	2151	seize, acquire	கொள்
30	127	𑌟	alaku, alanku, aragu	239, 240, 246, 255	beak, beauty, grains of paddy	அலகு, அழகு
30	180	𑌠	koṭṭu, koṭṭam	2063, 2064, 2066	pour, sting	கொட்டு (தேன்), கொட்டம்
31	249	𑌡	māṭṭu	4801, 4802	fasten, put in, fasten, hook, kindle, fire	மாட்டு
32	325	𑌢	ila	497	leaf	இல
33	54	𑌣	pu	4345	flower, insect, flourish, bloom, create	பூ (பூச்சி)
34	240	𑌤	cil	1577	small	சில்
35	257	𑌥	cutti, cuttiyal	2668	small hammer	சுத்தி, சுத்தியல்
36	192	𑌦	pallī	4018	hamlet, herdsman's village	பள்ளி
37a	190	𑌧	toṭṭi, pālaiyam	3485, 4117	fence, army camp, village surrounded by hillocks	பாளையம்
37b	189	𑌨	toṭṭi, tōṭṭi	3485, 3547	fence, rake	தொட்டி, தோட்டி
38a	76	𑌩	cē, cēval	1931, 2818	red, bronze, cock	சே, செம்மை, சேவல்,
38b	?	𑌪	cē, cēviran	1977	red, ear, red-eared hare	சே, செவி, செவியன்

Syllabic development

275 We outline from top to bottom how the syllabary is slowly developed from simple to complex glyphs. Happy journey!

M77 Sign	Glyph	Aglutination	Syllable	DED	Description	Tamil
1	𐀀	B8a	an	131, 132	person	அன்
	𐀁	B8a+B8a	an(n)-an	131, 132	brother	அண்ணன்
2	𐀂	B1+B8a+B1	kāvalan	1417, 1416	security guard	காவலன்
25	𐀃	B8a.B1	mutalvan	4950	chief	முதல்வன்
26	𐀄	B4.B1a.B8a	nal-mutalvan	-	good chief	நல்முதல்வன்
3	𐀅	B8a.B1a	aṇṇal, āl	110, 399	great man, servant, slave, soldier, messenger	அண்ணல், ஆள்
4	𐀆	(B10.B1a).B8a	nāṭṭān	3638	country man	நாட்டான்
5	𐀇	(B10.B1a.B2).B8a	nāṭṭu-ar-an	3638	country rules	நாட்டாரன்
6	𐀈	B1c.B8a	cutṭi-aṇ	2656, 2655	intelligent person	சுட்டியன்
7	𐀉	B1c.B8a	valiaṇ, vallavaṇ, vallāṇ, vallāṇ	5276	strong, skilled man	வலியன், வல்லவன், வல்லான், வல்லாளன்
18	𐀊	B1*.B8a	valiyan, vallavaṇ, vallāṇ, vallāṇ	5276	strong, skilled man	வலியன், வல்லவன், வல்லான், வல்லாளன்
162	𐀋	B9	vēl, vēl	5545, 5536	chief, spear, trident	வேல்
8	𐀌	B9.B8a	vēlan, vēṭan	5545, 5368, 5527	chief, lance fighter, hunter	வேலன், வேடன்
21	𐀍	B9.B8a	vēlan, vēṭan	5545, 5368, 5527	chief, lance fighter, hunter	வேலன், வேடன்
176	𐀎	B5.B1a	vanjī, anjih, aṇcal	5265, 56, 54	paddy, rice, to take on shoulder, resting place	வஞ்சி, அஞ்சி, அஞ்சல்
19	𐀏	(B5.B1a).B8a	vanjiyan	56, 54	skilled worker	வஞ்சியன்
20	𐀐	(B5.B1a).(B8a.B1a)	vanjiyāl	56, 54	helper, social worker	வஞ்சியான்
38	𐀑	(B5.B1a).B8a	vanjiyan	56, 54	skilled worker, dancer/entertainer?	வஞ்சியன்
9	𐀒	B11b.(B9.B8a)	valai-vēlan, valaiyan	5288	animal trapper	வலையன்

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
12	𑌕	B8b	uṛavan	688	farmer	உழவன்
13	𑌖	B8b.B1a	uṛavāḷ	688	farm worker	உழவாள்
14	𑌗	B22a.B8b	pēr-uṛavan	688	big farmer	பேர் உழவன்
15	𑌘	B8b.(B14.B2)	uṛavūr	688	working, farming town	உழவூர்
35	𑌙	B8b.(B14.B2)	valaiyan	5288	trapper, fisherman	வலையன்
37	𑌚	B11a*.B8a	valaiyan	5288	trapper, fisherman	வலையன்
39	𑌛	B1c.B8a	aṇṇal	110	great man, chief	அண்ணல்
41	𑌜	B22a*.B8a	kīṛān, ciṛuvaṇ	1621, 1594	poor, boy	கீழான், சிறுவன்
42	𑌝	(B15.(B1) ²).B8a	pallan	3986a	mahout	பல்ல(வ)ன்
43	𑌞	B8a.B1b	aṭiyavaṇ, aṭiyāṇ, aṭiyōṇ, mutalvan	72, 4951	slave, chief	அடியன், முதல்வன்
54	𑌟	B33	pu	4345	flower, insect, flourish, bloom, create	பூ (பூச்சி)
55	𑌠	B33.B1a	pol	4550	flowering, flourishing, blooming, creating	பொலி, பொலிவு
374	𑌡	B10	-n	1159b, 3621, 3621a	night, bug	நீர் (துளி), (ப)னி, நள், நல்லு
410	𑌢	B10.B10	ñāṇ, nān	2908, 3639	string, me	நாண், நான்
415	𑌣	(B10) ³	nānnan	2908, 3639	twiner	நாணன்
417	𑌤	(B10.B1a) ³	nalnelāl	-	good farmer	நல்தெல்லாள்
412	𑌥	(B10) ² .B16	nāṅkuru	2906	earthworm	நாண்குழு
186	𑌦	B15	kūru, kuru	1924, 1921, 1782	section/division/ share, to proclaim, brilliant	கூறு
299	(	B11a	ida, idai	449	hip, left	இட-, இடை
301	(	B11a.B10	idayan	450	herder, herdsman	இடையன்
287	)	B11b	vala-, vaḷai	5313, 5314, 5288	bent, trap, right, net	வல, வள, வலை, வளை
288	)	B11b.B1*	valacal	5278	emigration, flight	வலச்சல்
298	))))	B11b+B5	valaicci, valaiyacci	5288	surround, trap, hunter	வளைச்சி, வலையச்சி
293	)	B11b+B10	valaiyan	5288	animal trapper (short form)	வலை வேலன், வலையன்
303	)(	B11b+B11a	iṭa, iṭavai	432, 434	narrow way	இட, இடவை
187	𑌧	(B11a+B1).B15	kutai-kuru	1714	notch at end of	குதைகூரு

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
					bow	
312	ᳵ	B12	kuṭi, kuṭai	1655, 1660	house, family, lineage, hollow, cavity, penetrate	குடி, குடை
313	ᳶ	(B12) ²	kuṭir	1655	house, family	குடிர்
314	᳷	(B12) ³	kuṭima	1655	house, family	குடிம
315	᳸	(B12) ⁷	kuṭi-ēru	1655	immigration	குடிஏறு
316	᳹	B15*.B13	kurhu-kuṭi	1785-1655	deer/antelope-shelter	குர்ரு-குடி
317	ᳺ	(B3.B2).B12	mūri-kuṭi	5041-1655	buffalo-shelter, barn	மூரி-குடி
318	᳻	B11f.B22a .B12	nāl-vari-peru-kuṭi	1655	cross-way-big-shelter	நால்வழி-பெருங்குடி
395	᳼	B3.(B12.B4)	mu-kūṭal	1882	three-way-river-join	முக்கூடல்
328	᳾	B13	vu	651, 761	ooze, mortar	வ, உ, ஊ
?	᳿	B13.B1	vala, vala	5304	strong, fertile	வல-, வள-
32	᳠	B13.B8a	uvan		person between two	உவன்
330	᳡	B13.B3	mū-ū(r)	-	triple-town	மூவு
338	᳢	B13.B3	mū-ū(r)	-	triple-town	மூவு
339	᳣	B22h.(B13.B3)	mēl-mū-ū(r)	-	up triple-town	மேல் மூவு
332	᳤	B13.B5	vai	5549-53	to stay, straw of paddy, to abuse, sharp	வை
336	᳥	B13.B1.B10	uṭaṇ, valaṇ	945	with, consent, immediately	உடன், வலண்
337	᳦	(B13.B1.B10).B5	uṭai	593	wealthy	உடை
342	᳧	B13.B2	ūr (ural, urī)	752 (651, 708)	town, village	ஊர் (உரல், உறி)
347	᳨	B9.B13	vēlūr	-	hunter's town	வேலூர்
358	ᳩ	B38b.B13	cevūr	-	bronze worker's town	செவ்வூர்
344	ᳪ	(B13.B2).B2	ūr-ar	-	important sign with clitics	ஊரார்
343	ᳫ	(B13.B2).B1	ūr-il	-	important sign with clitics	ஊரில்
373	ᳬ	B14	pa	3805, 4016, 4124, 3884	sun, pot	பகல், பள்ளம், பானை, பண்
375	᳭	B14.B1	pal, pala	3986a	teeth, many	பல், பல
386	ᳮ	B14.B1*	poli, poḷi	4550,	prosperous, chisel	பொலி, பொளி

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
				4560		
379		B14.B3	pammu, pollam	3934, 4554	to baste, to yarn, stitch, joining	பம்மல், பொல்லம்
324		(B14) ² *	pinnu	4207	entwine, plait, weave	பின்னு
384		B14.B1*	pallā	3986a, 1045	elephant	பல்லா (யானை)
391		B14.B1*	pallā	3986a, 1045	elephant	பல்லா (யானை)
Depicted by the ornamental oval-shaped plate that is fixed on it's forehead						
392		B4.(B14.B2)	nal-pallar (nalla-palla-iru)	-	good mahout	நல் பல்லர்
393		(B14.B2).B12	pallar-kuṭi	1655	mahout hamlet	பல்லர்குடி
403		B14.B2	parai, parru	4031, 4032, 4034	announcement (sale) with a drum beat	பறை, பற்று
407		B14.B3	pulam, pollam, pollar	4303, 4554	arable land, stitching, tailor	புலம், பொல்லம், பொல்லர்
406		(B14.B1) ²	paḷapaḷa	4012	glittering, well-oiled	பளப்பள
404		B4.(B14.B2)	nal-parai		good announcement	நல்ல பறை
387		B9.B14	vēlappa		worker, hunter	வேலப்பன்
389		B14.B3*	pañ-nilam	3837	ploughed land	பண்ணிலம்
254		B16	paṭi, paṭṭi	3848, 3850, 3868	hamlet, village, settlement, rest, roost, step gradee, rank	படி, பட்டி
216		B17	ta (tandi, tondi, tavalai)	2946, 3110, 3549	earthen pot	தண்டி, தோண்டி, தவளை
217		B17.B17	toṭal, todū, toṭu	3480, 3482	touch, begin, join, to wear, dress-up	தொடல், தொடு
53		B17.B10	tāvu	3177	jump, luxuriant, tread gently	தாவு, தவளை
222		B17.B1	tal, tol	3123, 3105, 3516	obstruct, stop beat, crush, old, ancient	தள், தொள்
223		(B3.B3).B17	mumuta	4954	grand-parent	மும்முத
229		B17.B12c	taṛ, tāṛi	3178	bow down	தாழு, தாழி
36		B17.B8a	-tan	-	-	-தன்
?		B14.B10	pān	4068	song, melody	பாண்

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
396		B14.B10.B1	pāṇal	4071	rice-field	பாணல்
31		B14.B10.B8a	pāṇan	4068	tamil bard	பாணன், பாடுபவன்
40		(B14.B2).B8a	paraiyaṇ	4032	drummer	பறையன்
59		B18	kaṇ, kanni	1159a, 1166, 1168, 1417, 1483	bamboo raft, trap, trapper	கண், கன்னி
60		B4.B18	nalla-kanni	-	good vehicle, good trapper	நல்ல கன்னி
67		B19*	kondū, kōnda, gōnde	2053, 2216	bull, with	கொடு (கொண்டு), கோண்டே, கொண்டே, கொண்ட
72		B18.B1*	kōl	2238	boat, raft	கோல்
70		B18.B1	kāl	1483	cart	கால்
65		B22a.B19	peru-kanni		big boat, big cart	பெருங்கன்னி
75		B22a.(B19.B5)	peru-kaṇai	1404	intense, abundance	பெருங்கனாய்
69		B18.B4	kaṇṇal	1305, 1415	vessel, ship	கண்ணல்
66		B4.(B22a.B18)	nal-peru-kanni	-	great good gentleman	நல்பெருங்கன்னி
58		B18*	muttu	4959, 4932, 4957	pearl, excellent, praiseworthy	முத்து
78		B19	pori, puri, purā, purā, pūr	4286, 4334, 4374, 4603	courage, pride, chicken, pigeon, dove, quail, pheasant	புரி, பொரி, புறா,
77		B19.B10	paraṇ-	4020	bird farming, sustainer	பரண்- (பறந்தூர்)
79		B1d.(B19.B8a)	cuṭṭi-paraṇ	2655-4020	crested pheasant	சுட்டி பரண்- (பறந்தூர்)
80		B19.B19	paraparaṇ	3949	bird farming, pigeon messenger?	பறப்பரன்
81		B11b.B19	valai-pori	-	trapping bird	வலைபொரி
319		B20	muri, muṛi	4977, 5010, 5008	twist, twine, tender leaf, shoot, sprout, break, perish	முரி, முறி
134		B22a	peru, pēr	4411	big, large	பெரு, பேர்-
204		B22b	meruku, mēruve	5074, 5094	shining, pyramid	மெருகு, மேரு
205		B22c	nal-kompu, nāmpu	2115, 3649	good clever, sprout of millet	நால்கொம்பு, நாம்பு

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
206	𐤀	B3.B22b	mū-mēññal, mū-mēval	5097, 5096	long-lasting plough/desire	மூமேன்னல், மூமேவல்
207	𐤁	B4.(B3.B22b)	nal-mū- mēññal, nal- mū-mēval	5097, 5096	good long-lasting plough/desire	நல்மூமேன்னல், நல்மூமேவல்
209	𐤂	B22b*.B1	mēval	5096	join, unite	மேவல்
210	𐤃	B22b.B1	mēyccal	5093	grazing, pasture	மேய்ச்சல்
261	𐤄	B22d	kō	2177, 2178	mountain, gentry	கோ, கோட்டை
Origin of the word “kō” could be the Gond people (gōnde, DED 2216) of the mountains, reinforced by the West wind, from western practice of having kings in Sumeria						
30	𐤅	B22d.B8a	kōvan		herder, herdsman, gentry	கோவன்
Cattle class that eventually becomes the ruling gentry						
267	𐤆	B22d.B22d*	kōṭṭa, kōṭu	2207, 2053, 2203, 2200	gift, munificence, fort, gentry (west wind, western practice of having kings in Sumeria), horn	கொட, கோட்ட, கொடு, கொம்பன்
272	𐤇	B22d.B5	kōṭai, koṭai	2207, 2049	fort, gift	கோட்டை
271	𐤈	B22d.B3	kōṭṭam	2058	cattle-shed	கோட்டம்
277	𐤉	B22d.B1	kōṭṭāl	-	fort guard	கோட்டான்
201	𐤊	B22e	vāyil, vāyal, vācal	5354	doorway, entrance	வாயில், வாசல்
244	𐤋	B22f	aru, ārru, arai, araṇ	317, 407, 322, 201	strong, dwellment, camp, room, castle	அறு, ஆறு, அறை, அரண்
242	𐤌	B22g	māṭi, māṭikai, māṭam	4796a	mansion, terrace, hall	மாடி, மாளிகை, மாடம்
243	𐤍	B22g.B13	māṭu	4798	ox	மாடு
197	𐤎	B22h	mē, mēṭu, mettai	5086, 5058, 5069	top, terrace	மேல், மெத்தை
198	𐤏	B22h.B3	mē-mū	5086	higher maturity	மேமூ
199	𐤐	B22h.B9	mē-vēl	5086	excellent hunter	மேவேல்
200	𐤑	B4.B22h	nal-mēl	5086	good excellence	நல்மே
402	𐤒	(B10-B4).B1*	nāṭu	3638	country (as a contrast to forest)	நாடு
245	𐤓	B23	taṭṭi, taṭṭu, taṭṭān	3036, 3039	cloth, wooden frame, hammer, tap	தட்டி, தட்டு, தட்டான்
246	𐤔	B23.B1	taṭṭiyal	3036	smithey	தட்டியல்
296	𐤕	B11c	vaṛi	5297	way	வழி



M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
149	⌘	B11d	nālvaṛi	5297	cross-road	நால்வழி
297	⌘	B6.B11c	aruvaṛi	5297	six-way crossing	அறுவழி, ஆறுவழி
135	⌘	B22a.B11c	peruvaṛi	5297	big way	பெருவழி
136	⌘	B5.B22a.B11c	aim perumvaṛi	5297	five big way	ஐம் பெருவழி
153	↑	B22a.B1	poruḷ, poruḷi, poraḷ	4544	rich, wealthy, high position, handsome	பொருள், பொருளி, பொரள்
155	†	B24	ampi	177	boat, raft, ship	அம்பி
156	)†(	B12b.B24.B12a	iṭa-ampi	432, 177	furrowing boat, power boat	இட-அம்பி
211	↑	B25	anuppu (ampu), anpu	329 (178), 330	send, love	அனுப்பு, அன்பு
212	⌘	B24*.B25	mitavai-anuppu	4841	send boat	மிதவை அனுப்பு
195	⌘	B22i.B8a	mēlan	5086	superior	மேலன்
196	⌘	B22i.B22i.B8a	mēl-mēlan	5086	excellent	மேன்மேலன்
213	⌘	(B25.B24)*	varu-ampi	5270, 177	receive boat	வரு அம்பி
83	⌘	B26	iṛakkam, iṛappu, iṛakkam, iṛappu	501, 514	death	இழக்கம், இழப்பு, இறக்கம், இறப்பு
50	⌘	B27a	āṭu	347, 5152	dynamic, enjoy, play, dance, goat	ஆடு
184	⌘	B27b	ampalam	173	village assembly	அம்பலம்
124	⌘	B2b	ēr	2815	plough	ஏர்
125	⌘	B2c	eṛu	863	full, strong	ஏறு
126	⌘	B2d	cēr	2814	join, unite, mingle	சேர்
161	⌘	B2e	vilaku	5423	diverge	விலகு
137	⌘	B2x	cēri	2007	village street, assemblage, hamlet	சேரி
138	⌘	B22a.B2x	perum-cēri	2007	big assemblage	பெரும் சேரி
139	⌘	B22i.B2x	mēl-cēri	2007	high assemblage	மேல் சேரி
140	⌘	(B4.B2).B2x	nal-iru-cēri	-	good big assemblage	நல்லிருச்சேரி
141	⌘	B2x.B11e	cēri-vaṛi	-	road to assemblage	சேரிவழி
142	⌘	B22i.B2x.B11e	mēl-cēri-vaṛi	-	road to high assemblage	மேல்சேரிவழி
143	⌘	(B4.B2).(B2x.B11e)	nal-iru-cēri-vaṛi	-	road to good big assemblage	நல்லிருச்சேரிவழி
144	)⌘(	B11b.B2x.B11e.B11a	iṭai-cēri-vaṛi	-	road to herder assemblage	இடைச்சேரிவழி

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
145	✠	(B2x.B11e).(B5.B1)	cēri-vaṛi-vanjiḥ	-	road to assemblage resting place	சேரிவழிவஞ்சி
146	✡	B2x.B10	nān-cēri	-	thread maker assemblage	நாண்சேரி
147	✢	B2x.B10	nān-cēri?	-	thread maker assemblage	நாண்சேரி?
158	✣	B2x.B1	cēral	2007	assemblage	சேரல்
159	✤	B22a.(B2x.B10)	perum-cēral	2007	great assemblage	பெரும் சேரல்
160	✥	(B2x.B10).(B10-B4.B1*)	cēral-nāṭu	2007	country assembly	சேரல் நாடு
47	↷	B28	araṇ, araṇa, araṇai	201, 203, 204	fortress, gift, squink	அரண், அரண, அரணை
48	↸	B4.B28	nal-araṇ, araṇ-nal-, ara-nal-	-	good defence, good fort, good gift	நல் அரண், அரநல்-, அறநல்-
48-1187	↹	B28.B3	aram	311	virtue, moral duty	அறம்
113	(||||)	B11a.(B4.B3).B11b	viḷai-ñālam	5437, 2913	fertile land	விளை நாலம்
415	⌘	(B10.B1) ³	mū-pala	7-	important many	முப்பல
?	≡	B4.B1	nal-inai, nāl-inai	-	good joining, joining four	நல்லிணை, நாலிணை
49	↻	B29a	kuṛumpu, kuḷampu	1844, 1829	chieftain (kuṛumba tribe)	குறும்பு, குளம்பு
51	↺	B29b	māru, mārru, mārrī, māran, iruvaṛi-māran-kuṛumpu	4834	barter, strong leader	மாறன், இருவழி-மாறன்-குறும்பன்
302	↻	B29c	mārral, māru-koḷ	4834	exchange	மாற்றல், மாறுகொள்
129	↻	B29d	koḷ	2151	seize, acquire	கொள்
130	↻	B29d.B1	koḷal	2151	exchange, buy/sell	கொள்ளல், கொள்முதல்
148	✠	B2x.(B29d.B1)	cērukoḷal	5297, 2151	exchange together	சேர்ந்துகொள்ளல்
237	□	B1b	mutal	4951	base, foot, stump	முதல்
238	▢	B1b.B11e	mutal-vaṛi	4951	eminent way	முதல்வழி
239	▣	B1b.(B34.B2)	mutal-ciṛa	4951, 2589	first eminent	முதல் சிற
304	↻	B11c	vil, viḷ	5422, 5421, 5432, 5433	bow, call out, sell	வில்
305	↻	B11c.B5	viḷai	5437	productive, mature	விளை
127	↻	B30	alaku, alanku,	239, 240,	beak, beauty,	அலகு, அழகு

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
			aṛagu	246, 255	grains of paddy	
306	𑌕	B30.(B11c.B3)	aṛaku-vilam	-	good home	அழகு ஈஇல்லம்
307	𑌖	B11c.B1	viḷampu	5433, 5434	proclaim openly, serve food	விளம்பு
17	𑌗	B1c.B8a	villavaṇ	5422	archer	வில்லவன்
28	𑌘	(B11c.B1c).B8a	viḷampan	5434	one who superintends the distribution	விளம்பன்
310	𑌙	B11c.B11c*	vila-vila	5424	tremble with fear	விலவில
397	𑌚	B10.B1	aṇi, aṇiyal, maṇi-	116, 4672	jewel, pearl necklace	அணி, அணியல், மணி, முத்து மாலை
398	𑌛	B22a.(B10.B1)	peru-aṇi(yal)	116	big pearl necklace	பெரு அணி
377	𑌜	B4.(B10.B1).(B14.B1)	nal-aṇi-pala	-	many good pearl necklaces	நல் அணி பல
233	𑌝	B3b	mumalai	-	three mountain range	மும்மலை
235	𑌞	B3b.B9	mumalai-vēl	-	three mountain hunter	மும்மலை வேல்
180	𑌟	B30	koṭṭu, koṭṭam	2063, 2064, 2066	pour, sting	கொட்டு (தேன்), கொட்டம்
181	𑌠	B30	koṭṭu	2063, 2064	pour, sting	கொட்டு
169	𑌡	B4*.B3	nilam	3676	land, ricefield	நிலம்
171	𑌢	B4*.B5	nilai	3675	firm, stable	நிலை
173	𑌣	B2.(B4*.B5)	irunilai	3675	very firm, stable	இருநிலை
174	𑌤	B2.(B4*.B3)	iru-nilam	481, 3676	great/vast land	இருநிலம்
88	𑌥	B4.B2	nal-iru	3610, 480	fine life	நல்லிரு
176	𑌦	B5.B1	vanjī, anjih, aṇcal	5265, 56, 54	paddy, rice, to take on shoulder, resting place	வஞ்சி, அஞ்சி, அஞ்சல்
166	𑌧	B9.(B5.B1)	vēl-vanjī	-	hunter's lair	வேல்வஞ்சி
167	𑌨	B9.B2	vēḷir	5545	chief	வேளிர்
168	𑌩	B9.B7	vevvēru	5548	several	வெவ்வேறு
170	𑌪	B4.(B10-B4.B1*)	nal-nāṭu	3638	good country	நல்நாடு
249	𑌫	B31	māṭṭu	4801, 4802	fasten, put in, fasten, hook, kindle, fire	மாட்டு
253	𑌬	B31.B1	māṭṭal	4802	necklace	மாட்டல்
252	𑌭	B31.B3	mārram (māṭṭu)	4834	exchange, barter	மாற்றம்


M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
			+ mū)			
182	𑌕	B12a.B2, B12a.B11e.B2	iṭaiyar, iṭa-vaṛi-er	450	herder, guide	இடையர், இடவழியர்
178	𑌕	B*.B3	kalappai, kalam	1304	plough, vessel, ship	கலப்பை, கலம்
323	𑌕	B32*	il, ila	494, 497	non-existence, leaf	இல்
325	𑌕	B32	ila	497	leaf	இல
326	𑌕	B32.B5	ilai, iḷai	497, 496, 513	leaf, young	இலை, இலஞ்சி
327	𑌕	B32. B11e.B8a	iḷavaṛian, iḷaivaṛian	-	horticulturalist?	இலைவழியான்
76	𑌕	B38a	cē, cēval	1931, 2818	red, bronze, cock	சே, செம்மை, சேவல்
311	𑌕	B11d	yār, eṇil	5156	harp, music, beauty	யாழ், எழில், இசை
400	𑌕	B10.B1.B10	nuṛan	3714, 3715	penetrate, stitch	நுழ்-, நுழன், நுழம்பு, நுளம்பு
219	𑌕	B17.B5	tai (ta + kaccai)	3473	sew, stitch	தை
214	𑌕	B2.B17	irutai	481, 3473	strong stitch, good tailor	இருதை
?	𑌕	B34*	cī, cīpu, cil, calli	2599, 2622, 1577, 2382	cleanse, wooden peg, splinter	சீ, சிப்பு, சில்
240	𑌕	B37	cil	1577	small	சில்
241	𑌕	B2.B37	cīra	2589	eminent, illustrious	சிற-
381	𑌕	(B37.B2).B14	cīrappu	2589	eminent, illustrious	சிறப்பு
256	𑌕	B1e.(B37.B2)	nērcīra	3772	just and eminent	நேர்சிற
266	𑌕	(B4.(B37.B2)).B22d	nērcīra-kō	2177	just and eminent leader	நேர்சிற கோ
215	𑌕	B17*.B2.B18	cīruta, cīrutai	2590	panther, leopard	சிறுத்த, சிறுத்தை
258	𑌕	B34.B2.B5	cīrmai	2624	excellence, greatness	சீர்மை
257	𑌕	B35	cutti, cuttiyal	2668	small hammer	சுத்தி, சுத்தியல்
259	𑌕	B35	cutti, cuttiyal	2668	small hammer	சுத்தி, சுத்தியல்
192	𑌕	B36	pallī	4018	hamlet, herdsman's village	பள்ளி
193	𑌕	(B22a.B3).B36	perum-puli	4307,	big tiger	பெரும்புலி

M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
				4411		
321	𑌕	B10.B10	ñāṇ	2908	marriage string, necklace	நாண்
322	𑌖	(B10) ² .B1*	nēññil	2907	plogh-shaft	நென்னில்
367	𑌗	(B10) ³	nānan	2908	yarn maker	நாணன்
82	𑌘	B?.B15	tarupu	3142, 3169	to join together, amass (wealth)	தறுப்பு (தாரா - வாத்து)
247	𑌙	(B34.B1) ⁴	ciḷ-eṇal, ciḷu-ciḷ-eṇal	2588	noisy, bubbly, rainy	சிள்-எணல், சிளு-சிள்-எணல்
248	𑌚	(B34.B1) ⁴ .B1	ciḷ-eṇal, ciḷu-ciḷ-eṇal	2588	noisy, bubbly, rainy	சிள்-எணல், சிளு-சிள்-எணல்
341	𑌛	B13.B2	uru, uru(ku)	689, 659, 661	harrow, ship, tender, melt (as the heart), kind, glow with love	உழு, உரு(க்கு)
177	𑌜	B4.B1	nal-mutal, nalāl	-	good chief, good worker, hard worker	நல்முதல், நல்லாள்
409	𑌝	(B10) ² .B1e	nan-nil	3588	good standing	நன்னில்
365	𑌞	B2g	viri	5411	spread, expand, blossom	விரி
190	𑌟	B37a	pālaiyam	4117	army camp, village surrounded by hillocks	பாளையம்
189	𑌠	B37b	toṭṭi, tōṭṭi	3485, 3547	fence, rake	தொட்டி, தோட்டி
191	𑌡	B37b.B1	toṭṭil	3486	cradle	தொட்டில்
202	𑌢	B22i	mēṭṭu, mēḍu, metta	5058, 5069	height, eminence, hillock, upper storey, storied house	மேட்டு, மேடு, மெத்த
203	𑌣	B22i*.B22i	mēl-mēṭṭu, mēl-mēḍu, mēl-metta	5058, 5069	height, eminence, hillock, upper storey, storied house	மேல்மேட்டு, மேல்மேடு, மேல்மெத்த
188	𑌤	B22i.B4	mett-eṇal, mell-eṇal	5070, 5078	gentle, soft	பெத்தெனல்
366	𑌥	B13.B1.B1	utaḷ	610	goat	உதல்
131	𑌦	B22i*.B41	mēl-ala	240	highly active	மேல்அல, மேல்அலை
132	𑌧	B21	ala, alai	240	wave, commotion	அல, அலை
133	𑌨	B2.B21	iru-ala	240	big-wave, big-	இருஅல, இருஅலை






M77 Sign	Glyph	Agglutination	Syllable	DED	Description	Tamil
					commotion	
45		B13.B2 (ideographic)	ūr	749	crawl, creep	உளர்
46		B13.B2.B3 (ideographic)	urumu, urum	718	growl, grunt, roar, thunder	உறுமு, உறும்

Fish signs and it's varied manifestations

If we look at the frequency of the consonants in Tamil (both modern and old), the one that comes on top is “ka” and not “ma” or “mi”. We know that the fish sign is the most frequent in Indus script, so the obvious Turing’s not so enigmatic result is that the fish sign must start with “ka” and we found “kanni” is probably more feasible. However, our result “kanni” is independent of it and was inspired by M.V.Bhaskar’s interpretation (personal communication) that the “Garial” (the river crocodile) is synonymous with fish and was probably trained and used as a boat. My own personal exposure to local customs also revealed that “kanni” is a term used commonly in earlier times for boat or any vehicle. The analogy could be that “kanni” refering to a women carrying children or it could be that the boat itself was driven by women in those days. However, this analogy is not without it’s difficulty. The word “kaṇṇi” refered in modern Tamil to be a maiden is without any support in DED [1]. The only support comes the word “kaṇi” according to DED 1408 is “tender”, “love”, “devotion” etc., and so is “kātal” DED 1445 - “love”, “affection”, “lust” etc. From not so mystical angle it could be just derived from “kaṇ” DED 1159 “eye”, “peacock’s tail”, probably leading to a mystical euphemism. Support from another quarter is “traveling places” come from DED 1443 “kāṇ” – “to see”, DED 1161 “kaṇ” – “place”, DED 1166 “kaṇai” - “arrow”, and DED 1109 “kaṭa” - “to move”. The interpretation that it is “kaṇṇi” is reinforced by other evidences like sign-63 “kaṇṇi-pori”, where it is meant as a “snare” DED 1183+4538.

Assuming that sign-59  is “kaṇṇi”, it could mean any of these things: vehicle, boat, cart, trap, trapper, soft, tender etc. We will show lines of text that seem to provide such evidences, but before that we decide a few variants of fish sign and phrases:

Standalone fish signs

M77 Sign	Glyph	Syllable	DED	Description	Tamil
59		kaṇ, kaṇṇi	1408, 1109, 1183, 1159	boat, bamboo raft, soft, trapping	கண், கண்ணி
72		kōl	2238	boat, raft	கோல்
70		kāl	1483	cart	கால்
65		peru-kaṇṇi	-	big boat	பெருங்கண்ணி
67		kondu, kōnda, gōnde	2053, 2216	bull, with	கொடு (கொண்டு), கொண்டே, கொண்டே, கொண் ட

Fish sign phrases

M77 Signs	Glyph	Syllable	DED	Description	Tamil
67-65	𐌆𐌆	peru-kanni-kondu	-	with big vehicle	பெருங்கன்னி கொண்டு
70-67	𐌆𐌆	kondā-kāl	-	bullock cart	கொண்டா கல், கோண்ட கல், மாட்டு வண்டி
70-67-65	𐌆𐌆𐌆	peru.kanni-kondā-kāl	-	big bullock cart	பெருகன்னி கோண்ட கல், பெரு மாட்டு வண்டி
72-67	𐌆𐌆	kondā-kōl	-	bullock raft?	கொண்டா கோல்
59-328	𐌆𐌵	u(ka)-kanni	559, 563	boat rising in waves	யுக கன்னி

300 Reading lines of text with fish sign

Sample line 1 (kanni = trapper)

𐌆 𐌵 𐌆 |

mutal-vilampan-mu.malai-kanni

முதல்-விலம்பன்-மும்மலை-கன்னி

Semantics:

Chief archer, an expert trapper of three mountains

Sample line 2 (kanni = transport vehicle)

↑ 𐌆 𐌵

nilai-kanni-anupu

நிலை-கன்னி-அனுப்பு

305 Semantics:

(Please) sends (goods) by a stable boat/raft/cart

Sample line 3 (kanni = boat/raft)

↑ 𐌵 𐌆 𐌆 || 𐌵 𐌆

palla-ar-iru-kanni-kōl-velan-ūr-anupu

பல்லர் இரு கன்னி: கோல் (மூலம்) வேலனூர் அனுப்பு

Semantics:

Elephant town turthful kind man: sends (goods) by boat to hunter's town

310 Agriculture and it's related signs

M77 Sign	Glyph	Syllable	DED	Description	Tamil
12	𑌒	uravan	688	farmer	உழவன்
13	𑌓	uravāḷ	688	farm worker	உழவாள்
14	𑌔	per-uravan	688	big farmer	பேர் உழவன்
15	𑌕	uravūr	688	working, farming town	உழவூர்
112	𑌖	ñālam, nallam	2913, 3613	land, fertile black-soil	நாலம், நல்லம்
169	𑌗	nilam	3676	land, ricefield	நிலம்
169-112	𑌘	ñālam-nilam	2913-3676	fertile land, ricefield	நாலம் நிலம், நல்லம் நிலம்
113	(𑌙)	viḷai-ñālam	5437, 2913	cultivated land	விளை நாலம்
389	𑌚	pañ-nilam	3837	ploughed land	பண்ணிலம்
178	𑌛	kalappai	1304	plough	கலப்பை
124	𑌜	ēr	2815	plough	கலப்பை
341	𑌝	uru	689	harrow	உழு (பரப்பு, பரம்பு)
176	𑌞	vanji	5265, 56, 55	paddy, rice	வஞ்சி
412	𑌟	nāṇkuṛu	2906	earthworm	நாண்குழு

Franklin Southworth [6] work on connection between rice cultivation and Dravidian language shows how vanjī is related to rice:

315 “vari-(n)ci (with variants *vari, *varici, *varinci) ‘rice, paddy’ DED 5265 can be reconstructed for Proto-Peninsular Dravidian ... It is the source of the word for ‘paddy’—i.e., rice in the field or after harvesting and threshing, either husked or unhusked, but not yet cooked—in most of the modern Peninsular Dravidian languages. This word may be connected to the Elamite bar ‘seed’—though there is some doubt, as the phonetic correspondences are not regular. A related form, *ari-ci/ki, with variants ari, arici, akki, arki (the last two ← *ariki) DED 215”

The Indus barter exchange system

320 We only illustrate the key points here. The local barter happens in the undocumented unorganized sector at the cross-roads (𑌠), in what is termed as “cantai” (சந்தை) in modern Tamil. The exchange is abstracted by the symbol 𑌡 and the barter mediated by 𑌢 (maran?), who is usually qualified by great reliable ancestary (flowery self-praise by the system). The exchange is done by symbol 𑌣 (kol, the dagger of exchange) and 𑌤 (an abstraction of the cross-road, 𑌠). Most of the script pertains to
325 official barter transactions of Indus, which are really instructions of transporation mode and the origin/destination. The clitics like 𑌥 (M77-99) orchestrate the sentence structure of the lines of the seals. An highly compressed form of information exchange mechanism is enabled by the drsastic use of poly-semantic logo-syllabic script with each of these logo-syllables having many semantic possibilities with high degree of pun. This is so deeply wedded to Indus culture and mode of

330 exchange that the deciphering of it has taken so long. The skills of bronze-age artisans is in full display here with those hundreds of poly-semantic logo-syllables crafted and designed with care to work in those small spaces available in the seals. What is interesting that the deeply mysterious swastic symbol (M77-148) is now understood as the mundane:

𐌶 = 𐌶+𐌶 = cērukoḷ = சேர்ந்துகொள்

335 i.e., declaration of an important exchange, which is usually followed by drum beats '𐌶'. The drum beats are also a way to invite more people to the square for exchange (at cross-roads).

Relative volume of trade

We consider the absolute occurrence numbers in the text and also the association to the right of sign no. 99 𐌶. If we assume that what precedes (to the right of) sign. 99 𐌶 is the sender of goods then we
340 get the following data:

Glyph	Description	No. occurrences	Forward transactions
𐌶	Cattle	369	290
𐌶	Ivory	182	82
𐌶	Hunting and trapping	130	61
𐌶	Agriculture	225	18
𐌶	Honey	44	18
𐌶	Elephant herding?	15	10
𐌶	Cross-road	41	8
𐌶	Tailoring	14	4
𐌶	Jewellery	12	3

Among 634 occurrences in IVC text with sign no. 99, assuming that what comes to it's right is the region that is sending commodities to the other regions, we can summarize that cattle and agriculture were the dominant activities, closely followed by carpentry and elephant-based
345 products. Hunting, honey-gathering, fishing, carpentry, weaving and stitching were the other important activities that created products participating in the organized barter system of IVC. Hunting, honey-gathering, fishing, carpentry, metallurgy, weaving and stitching were the other important activities that created products participating in the organized barter system of IVC.

Class structure of IVC

350 It seems from the table above that the cattle herders had the dominant trade surplus and probably the agriculturists had the highest trade deficit. Sign-41 𐌶 kīrān (DED 1621) கீழான் refers to a poor person and studying his concordance we see that he is strongly associated with sign-137 𐌶 cēri (DED 207) சேரி, a place where many people assemble, associated in modern terms with the hut dwellments or slums in cities. It is quite surprising that this association has remained true for 5000

355 years! It is also noted that sign-41 𑌕 (kīrān) has atleast one association with all professions, except cattle herding (sign-267 𑌕). So it is clear that there is a class structure associated with IVC which puts cattle-herders (𑌕) at the top.

Praise heaped on the farmer

360 The barter system's accumulation of wealth by the ruling elite (sign-30 𑌕 "kovan"), accumulated in store-houses (sign-267 𑌕 "koṭṭa") necessitates a rhetoric of praise on the toiling farmer (sign-12 𑌕 "vuṛavan") like:

M77 signs	Glyphs	Syllable	Tamil	Description
12-75	𑌕 𑌕	peru.mu.kanni-vuṛavan	பெரும்மூக்கன்னி உழவன்	Enormously mature and soft farmer
12-2-86	𑌕 | 𑌕 |	mutal-kāvalan-vuṛavan	முதன்மை காவலன் உழவன்	First guardian farmer
12-325-86	𑌕 𑌕 |	mutal-ilai-vuṛavan	முன்னிலை உழவன்	The foremost farmer

Such eulogy of farmer and farming has continued even 2000 years after IVC culture in Thirukkural:

Kural 1031: Howe'er they roam, the world must follow still the plougher's team;

365 **Kural 1032:** The ploughers are the linch-pin of the world; they bear.

Frequency of adjectives of towns

Adjectives of towns	Syllable	Frequency	𑌕* Frequency	𑌕* Frequency	Description	Tamil
𑌕	nilam	225	47	18	land	நிலம்
𑌕	vēl	196	40	8	lance	வேல்
𑌕	nal-aran	168	114	0	good morals	நல் அறன்
𑌕	valaiyan	130	14	54	trapper	வலையன்
𑌕	vēl	117	112	0	hunter's town	வேலூர்
𑌕	vēlan	104	93	0	hunter	வேலன்
𑌕	arai	87	34	0	godown	அறை
𑌕	nal-vaṛi	87	44	1	cross-road	நால்வழி
𑌕	valai	80	37	7	net	வலை
𑌕	vari	35	32	0	road	வழி
𑌕	ce	32	32	0	bronze town	செம்பூர்
𑌕	peru-vaṛi	35	23	0	big road	பெருவழியூர்
𑌕	puli	25	21	0	tiger country	புலி
𑌕	tatti	134	70	6	smithy/carpenter	தட்டி
𑌕	er	78	16	0	plough	ஏர்
𑌕	iru-valai	51	28	0	strong net	இருவலை
𑌕	tai	129	40	9	tailor	தை
𑌕	ilai	32	18	0	horticulturist	இலை

Adjectives of towns	Syllable	Frequency	𑌵* Frequency	𑌶* Frequency	Description	Tamil
𑌵𑌶	vālai-kanni	13	12	0	fishing	கன்னி வலை
𑌵𑌶𑌶	nalnellal	61	14	8	good farmer	நல்லநெல்லாளர்
𑌵𑌶𑌶𑌶	vilai-nallam	17	15	0	fertile rich land	விளை நல்லம்
𑌵	mēl	56	14	2	uptown	மேல்
𑌵𑌶𑌶	mu.iru.mēl.pēr.ul	56	27	1	mighty uptown	மூவிருமேல் பொருள்

Other adjectives (praise) and their frequencies

Adjective	Syllable	Frequency	Description	Tamil
𑌵	nal-aran	168	good moral	நல் அறண்
𑌵𑌶𑌶	mu.iru.mēl.per.ul	56	mature-truthful-all-mighty	மூவிருமேல்பொருள்
𑌵	mutal	143	chief, foremost,	முதலாம், முதலவன்
𑌵	mū	300	mature	மூ-
𑌵	alaku	47	beauty, unperturbed	அழகு, அலங்கா
𑌵	nilai	130	firm, stable	நிலை
𑌵	iru-nilai	38	very firm, stable	இருநிலை

Postpositions and their frequencies

370 This is the equivalent of prepositions in English, but in Tamil they are post-positions and not prepositions.

M77 sign	Glyph	Frequency	Syllable	Description	Tamil
336	𑌵	229	utan	with, together, agreement	உடன்
99/100	𑌵	663	-ar	it's	-ஆர்
123	𑌵	189	-ar	it's	-ஆர்
97/98	𑌵	174	-il	-in	-இன்

Broad observations

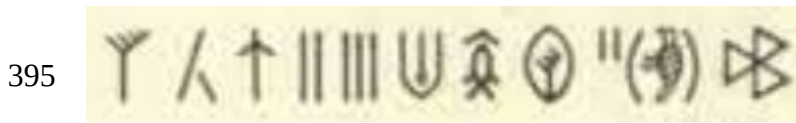
375 One of the surprising observation in this decipherment is that almost no individual identities like personal names are found in the text. All trade transactions are from one collective identity like country, village/town to another country, village/town. Individuals are extolled within the collective identity of farmers, workers, etc. There are however, strong leadership role identities like chief “mutalvan”, “peru(m)-kanni”, “mu-velan”, “iru-velan” etc. It seems that there are store houses where the items are sent and dispersed through some social mechanism of distribution. It seems that the
380 distribution process could be related to sign-37 𑌵 “vilampu” (DED 5434) and sign-28, 𑌵 “vilampan” seems more like the supervisor of distribution of goods. Sign-17 𑌵 (villavan, villōṇ)

seems like another protection officer cader maintaining law and order. Probably the sign-176 𑌕
“anjih” is a place each of the specialized workers like tailors, jewellery makers, carpenters, bronze
workers, ivory workers, with each having a separate specialization location in town where others
385 can reach them as targets for exchange. This tradition continues in many town in India even now,
although in rapid decline with the arrival of multispeciality supermarkets.

Semantic reading

The whole exercise of decipherment will be meaningless gibberish if it doesn't lead to any to proper
semantic outcomes. We have already seen a range of professions, towns and trade symbols that we
390 are able derive from the excercise. We will now read a few lines using the above syllabary that we
have declared.

1. M77 Line 1006-100101



NFM font equivalent rendering:

𑌕 𑌔 𑌕 𑌕 𑌕 𑌕 𑌕 𑌕 𑌕 𑌕

400 Very clever trapper velappan of the triple mountain: sends by boat along the big river with care to
the tiller of land

பறவைகளை வேட்டையாடி விற்க்கும் மும்மலையார் வேலப்பன்: பெருங்கண்ணி உடன் முன்னிருந்து
அம்பி (படகு) ஏர் உழும் நிலத்துக்கு)

The break-up steps:

𑌕(𑌕): valai-puri (வலை-புரி) mu-malai-ar (மும்மலை-யார்)

405 𑌕: velappa (வேலப்ப)

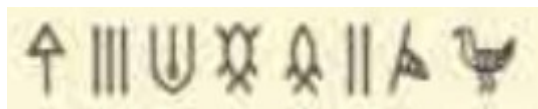
𑌕: peru-kaṇ-uṭan (பெருங்கண் உடன்)

𑌕 𑌕: mu-iru (மு-இரு)

𑌕: ambi (அம்பி)

𑌕: ēr-nilam (ஏர் நிலம்)

410 2. M77 Line 1008-100101



NFM font equivalent rendering:

△|||UXX-Ų||ḥḥ

- 415 Bronze countryman: sends by bullock-cart to triple mountain
சேவல் நாட்டார்: மாட்டு வண்டி உடன் மும்மலை(க்கு) அனுப்பு(கிறார்)

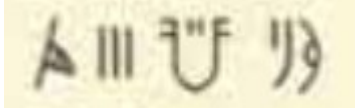
The break-up steps:

||ḥḥ: cēval-natt-ar (சேவல் நாட்டார்)

UXŲ: kanni-konṭa-uṭan (கன்னி கொண்ட உடன்)

- 420 △|||: mu-anupu (மூ-அனுப்பு)

3. M77 Line 1029-100101



NFM font equivalent rendering:

ḥ|||U"Ų))

- 425 Hunter/trapper townsman's three-mountain country
வேட்டையாடி வலை பிடிக்கும் ஊர் மும்மலை நாடு

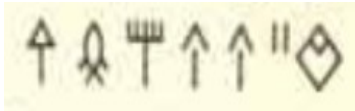
The break-up steps:

)): valai-an-in (வலையனின்)

Ų: ur-ār (ஊரார்)

- 430 ḥ|||: mu-nāṭu (மூநாடு)

4. M77 Line 1032-100101



NFM font equivalent rendering:

- 435 △ŲU"↑↑"◇

Cattle country: prized goods sent by stable boat
கோட்டுரார்: பெருமுதல் பொருள் நிலை கன்னியில் அனுப்பு(கிறார்)

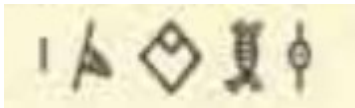
The break-up steps:

"◇: koṭ-ūr (கோட்டுரார்)

- 440 ↑↑: peru.mutal-poruḷ (பெருமுதல் பொருள்)

△ŲU: nilai-kanni-anuppu (நிலை கன்னி அனுப்பு)

5. M77 Line 1067-100101




NFM font equivalent rendering:


445 

The pearl necklaces are being bartered in cattle country
அணியல் மாற்றம் கொட நாட்டில்

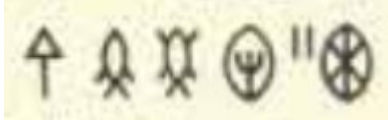
The break-up steps:

†: aṇiyal (அணியல்)

450 : marṛam (மாற்றம்)

: koda-nāṭu-il (கொடநாட்டில்)

6. M77 Line 1088-100101




455 NFM font equivalent rendering:




Elephant country velappan: sends by bullock cart
பல்லார் வேலப்பன்: மாட்டு வண்டியில் அனுப்பு(கிறார்)

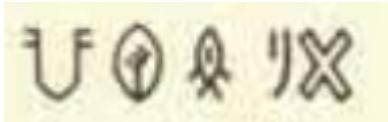
The break-up steps:

460 : palla-ar-velappa (பல்லார் வேலப்பன்)

: konde-kanni (கொண்டே கன்னி)

: anuppu (அனுப்பு)

7. M77 Line 1095-100101





465 NFM font equivalent rendering:




Cross-roads countryman sends cart to velappa town
நால்வழியார் வண்டி வேலப்ப ஊர்(க்கு)


The break-up steps:

470 : nal-vaṛi (நால்வழியில்)

: kāl (கால்)

: velappa-ur (வேலப்ப ஊர்)

Pluripotency

The fish sign-59  kanni takes the values of boat, craft, vehicle, bullock cart in these cases. We
475 have also observed that in some other case:






   |

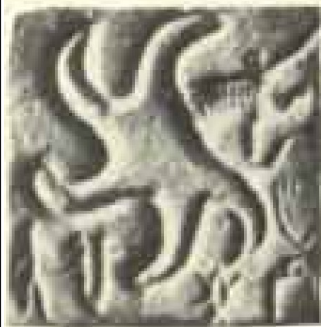



that the sign-59 $\hat{\diamond}$ kanni takes the value of “trapper” or “trapping”.



From these readings we also obtained:

Further readings

Graphics and text: a show and tell

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate V - 105		↑𑌕𑌃𑌃𑌃	iru-vilagu- ar-kanni- anuppu	prevent fighting by sending guard	இரு-விலக்கார்- கன்னி-அனுப்பு
Plate VI - 114		𑌕𑌃𑌃𑌃𑌃𑌃	mu-tāri-tai- koḷ-ūr-an	accept ancestral power transfer	மூதாழிதை கொள் ஊரான்
Plate IV - 80		𑌕𑌃𑌃𑌃𑌃𑌃	nal.vaṛi-yar- velan-kal- aru-ūr	Controller of cross-way Velan sending boat along the river in the town	நால்வழியார் வேலன் கல் ஆற்றுநர்
Plate IV - 81		𑌕𑌃𑌃𑌃𑌃𑌃	tan-taṛi- mu.ūr-kanni- ūr	Controller of many country transactions	தன்தாழி வேலப்ப முவூர் கன்னியூர்
Plate III - 55		𑌕𑌃𑌃𑌃𑌃𑌃	palla.kotta- ar-velan- kanni- anuppu-māṭi	Unity of seven (3+2+ 2) nation's Velan (controlling bureaucrat?): Elephant fort sending by	பல்லர் கோட்ட வேலன் கன்னி அனுப்பு மாடி/மாடு

M77	Graphics	Glyphs	Syllables	Description	Tamil
				vehicle to buffalo country	
Plate III - 54		𑌕𑌣𑌆𑌔𑌢𑌔𑌢𑌔𑌢𑌔𑌢𑌔	anjih.an- ūr-ar-mēl-konda-ūr-an	Five-cross-way multi-storeyed rest-house for travellers	அஞ்சியன் ஊரார் மேல் கொண்ட ஊரான்
Plate III - 57		𑌕𑌣	mu-puli(malai)-velan-eṟuvanji	Three-mountain tiger country excellent rest-house for hunters	மும்புலி வேலன் எழுவஞ்சி
Plate III - 50		𑌕𑌣𑌆𑌔𑌢𑌔𑌢𑌔𑌢𑌔𑌢𑌔	muvar-eṟuvanji-yar-ēr-ūr	Rhino country seal: Three-mountain rest-house to tiller's land	வலன் மூவன் வஞ்சியார்: ஏர் ஊர்
Plate III - 51		𑌕𑌣𑌆𑌔𑌢𑌔𑌢𑌔𑌢𑌔𑌢𑌔	palla-ar-māṭṭu-vel-ūr	Markhor country seal: Elephant country loads to hunter's town	பல்லர் மாட்டு வேலூர்

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate I - 18		புலையு	koṭa-ar-konda-para-iru-ūr	Elephant country (food): Cattle herder sending by bullock to messenger's town	கோட்டார்: கொண்ட பறையர் ஊர்
Line 1093		புலையு புலையு புலையு	konda ūr-tarupu-ūr velūr-ūr	Gathering of buffalo townsmen at Velūr town	கொண்ட ஊர் தறுப்பூர் வேலூர் ஊர்

Major countries depicted by animals in seals

This is another major category that is directly indicated by animals.

495 **Plate III -55 [2]**



500

Here we can see five major countries indicated branching from two unicorn motifs and here with two of them further branching into two subcategories.

The seal on the right is either calling for (or celebrating) bartering between five countries:

புலையு (para-ar-ūr, பறையூர்)

505 calling for five nations to join in the barter system

சுசுசுசுசு

(cērukoḷ, சேர்ந்துகொள்)

The animals that seem to indicate the five nations [4] in the seals are:

Markhor/Gaur (bison) ◇, Buffalo □, Elephant ⊕, Rhino ? and Tiger ✕.

510 Although all the skills and specialised skill centers (vanjih, 𑀧𑀺) are all distributed all over the towns and villages of all countries, in triple mountain tiger country (Afghanistan?) there seems to be preponderance of hunters, animal trappers and honey collectors.

A brief summary of the of the IVC writing system

515 The IVC system can be considered as a resolution of the contradiction arising between pure ideographic and pure syllabic system of writing. We were able to associate unique syllabic value to every sign. Although the ideographic system allows easy understanding of the base signs through a Dravidian root-word association, they also create a complex plethora of signs for the IVC writer to recognize and use. In order to reduce the number of signs needed, a pure syllable-based number system seems to have been used, which is affixed/prefixed/welded to the base sign to produce
520 agglutination of word-pieces. The core consonant backbone of the base is maintained in the agglutination process, but the affixes may retain only the front/middle/tail syllable, depending on whether it is affixed/infixes/prefixed, respectively. Although each sign signifies a syllable and not a concept or idea, an ideographic undercurrent remains strong throughout the IVC writing system, creating certain stability of the semantics of the writing system. It is also observed that certain
525 amount of arbitrariness is allowed during the agglutination process: deletion, modification or addition of vowels/glides. Glides are soft consonants that are added as binders for smooth phonetic transition between hard consonants. For proper understanding of practical Tamil grammar as it is spoken now one can consult Harold F. Schiffman [8], but one must not apply these grammar rules blindly to the IVC writing system, as 5000 years separate the present Dravidian languages and the
530 IVC languages.

Overlap with previous work

No work germinates on it's own; it usually germinates on a fertile ground laid down by others. There were many conjectures on this Indus writing system by Asko Parbola, Iravatham Mahadevan and Brian Wells. I will briefly outline some of them pointing out overlaps and differences. It all
535 started with the interpretation for fish sign as "mīn" by father Heras in 1930s [9]. This was reiterated with caution by Iravatham Mahadevan [10]. If we look at the frequency of the consonants in Tamil (both modern and old), the one that comes on top is "ka" and not "ma" or "mi". We know that the fish sign is the most frequent in Indus script, so the obvious Turing's not so enigmatic result is that the fish sign must start with "ka" and we found "kanni" is probably more feasible. However,
540 our result is independent of it and was inspired by M.V.Bhaskar's interpretation (personal communication) that the "Garial" (the river crocodile) is synonymous with fish and was probably trained and used as a boat. My own personal exposure to local customs also revealed that "kanni" is a term used commonly in earlier times for boat or any vehicle. This was probably dropped later on in Tamil literature. The same however continues in Indo-European tradition that associates feminine
545 gender to even a modern vehicle like train inflecting verb appropriately.

There were many interpretations by Asko Parbola and Mahadevan [11] on the M77 sign-342 𑀧𑀺, including "-an". MVB was quite critical of this being male-centric, an apt criticism, as he found no preponderance of male domination in IVC art. The interpretation of sign-1 𑀧𑀺 as "-an" has also been proposed by Bryan Wells [3] and then MVB's criticism can be cleverly overcome by stating that "-
550 an/-al" could have been sex-neutral term in those days and associating "-al" with feminine gender could have been a later invention by the male-dominant society (especially as "-al" has connotation

with darkness and evil). On other proposals of Iravadham Mahadevan and Bryan Wells's on numbers as being semantically numbers, we found no parallels in our interpretations. In fact, the numbers are probably the only signs that almost never reflected their standalone ideographic value. This was indeed quite suprising for us, as we found almost no evidence for this. MVB has been quite radical in this interpretation, proposing that almost a new syllabic system can be conjured-up using just the numbers alone.

Yuri Knorozov [12] has also done extensive study of the IVC writing system and he has correctly identified numbers as syllables, with sign-86 | identified as "or", || as "iru", ||| as "mu", |||| as "nal", ||||| as "ai". This is exactly as what we have deciphered here, although we consider sign-86 | as "mutal" and not "or".

Bryan Wells's work also proposes other possibilities like sign-358 𑀓 being closely related to the Hare's ears and so proposing the syllable "ce" from "cevia". The author is in full agreement with this proposal and in fact, both this and sign-76 𑀓 also evokes the same "ce" syllables. In the IVC context of bronze-age, these have semantic connotations to "cembu" (bronze). Bryan Wells also proposed "kō" for sign-261 𑀓 and "kōṭa" for sign-267 𑀓. We are fully in agreement with these readings.

Ansumali Mukhopadhyay [13] studied the word for teeth, "pa l la" and it's relationship to the ivory trade. The sign-391 𑀓 is here deciphered as "pa l la", the elephant, an important sign in the IVC, especially in relationship to the ivory trade. There could have been many more proposals that may have some overlap with our interpretations here. We would be glad to include them in our document as soon as we are made aware of them.

Farmer et al. [14] criticism that the average number of signs in a line are two short (on the average of between 4 and 5 signs) for any meaningful orchestration of a writing system is quite correct. However, our decipherment points out that these lines of text are mostly **from/to** addresses with mode of transport indicated through fish and arrow signs in-between the **from** and **to** addresses. Sometimes the mode of transport is left out (or is implied) and the same could be true of the **to** address, which probably is implied from the context. There are also very short lines heaping praise on towns and their workers. In any case, writing in crisp and short messages is a tradition that has continued for a long-time in Dravidian tradition, as established in Thirukkural, which is taught even now in schools of Tamilnadu.

Andreas Fuls [15] has made an excellent comparative study of Linear Elamite and Indus script, showing that the Indus script is quite different from the Linear Elamite and that it is probably "logographic-syllabic writing system with many signs representing a logogram, or word root". Our decipherment shows that this is indeed the case and that the root word or syllable are approximately 34 base signs from which 417 signs can be built using an aglutinative welding of bases and affixes.

Conclusions

First important study of the Dravidian family of languages was by Caldwell [16] in 1886. Recent studies indicate that the temporal origin of proto-Dravidian to be around 2500 BCE [17, 18], so it can be discerned that the Indus script could have been a major epicenter for the formation of the identity of Dravidian language family. We can even go ahead and conjecture that some aspects of Dravidian linguistic structure could have been a result of remoulding of languages of the Indus

Valley Civilization into an agglutinative reformulation as constrained and evolved by the Indus script. After the gradual decay of IVC, with southern migration of the population, the language could have radiated into the many branches of Dravidian family [17]. A detailed study of the decipherment and its relationship to Dravidian morphology could provide further clarity on this feasibility.

Acknowledgements

The decipherment became possible with the arrival of the splendid work by MVB [4]. This laid down the map that lead to all the linkage between graphics and the text, building this beautiful journey of discovery enabled by M.V. Bhaskar, with whom I have been working for the past several years. My learning in art, Brahmi and Indus Script derived from his interactions. Of course, all this work could not have been possible without the enormous efforts of Asko Parbola, Iravadham Mahadevan, Bryan Wells and many others. Thanks are also due to Eugenia Vanina for enlightening me about works by Russian scholars on Dravidian languages and the Indus script, especially the collected works of Yuri Knorozov [12].

Funding and Data availability statement

Partial funding was received from TNQ Foundation, Chennai while completing this work. All data required to access the scientific veracity of the work is available through the references cited at the end of the text and through the open web portal: <https://github.com/Sukii/decipher-ivc>. Any other data or references cited can be provided on request.

Conflict of interest

Author would like to state that there is no conflict of interest in this paper.

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